

REMARKS

Claims 17-22 and 24-29 are pending in the subject application. No claims have been indicated to be allowable.

35 USC §102

Claims 17-18, 21-22 and 24-27 stand rejected under 35 USC 102(b) as being anticipated by Vasalos et al. This rejection is respectfully traversed.

Applicants' invention as now claimed comprises a fluidizable catalytic cracking catalyst which reduces the sulfur content of a catalytically cracked gasoline fraction during a catalytic cracking process. The sulfur reduction catalyst comprises a porous molecular sieve component having a first vanadium metal and a second cerium comprising metal located in the pores of the molecular sieve component.

Vasalos et al. relates to catalytic materials which are useful for the reduction of gaseous carbon monoxide (CO) and sulfur oxide (SO_x) gases emitted from FCC regenerators (column 3, lines 31-33) during a FCC process. The reference is silent with respect to reducing the sulfur content of products produced during an FCC process. The catalytic material disclosed in Vasalos et al. may be in the form of solid particles which contain a molecular sieve type catalytic cracking catalyst such as a zeolite (column 3, lines 39-45; column 9, lines 47-48, line 63 et seq.). The material also contains a "metallic reactant" (column 4, lines 24-26) which reacts with sulfur oxide gas to form a metal and sulfur containing compound. In addition, a "metallic promoter" or "metallic oxidation promoter" can be present for the oxidation of carbon monoxide and sulfur oxide; this component is separate from the "metallic reactant" (column 4, lines 29, 36-37; column 6, lines 4-6, 18-22; column 14, lines 32-33, 40-42, 63-64; column 15, lines 7, 12-15; column 20, lines 9-13) and may be vanadium.

The metallic reactant and the metallic promoter may be present as a powder separate from the sieve type cracking catalyst (column 13, lines 62-68). Alternatively, the metallic reactant and/or metallic promoter may be incorporated onto a suitable support (column 14, line 33) which is then admixed with the sieve

The metallic reactant and the metallic promoter may be present as a powder separate from the sieve type cracking catalyst (column 13, lines 62-68). Alternatively, the metallic reactant and/or metallic promoter may be incorporated onto a suitable support (column 14, line 33) which is then admixed with the sieve type cracking catalyst (column 14, lines 39-42). Such support can be an amorphous cracking catalyst or a solid which is substantially inert to the cracking reaction.

The key teaching in Vasalos et al. as it relates to Applicants' invention is yet another alternative wherein the metallic promoter or metallic reactant or both may be incorporated into the sieve type cracking catalyst (column 14, lines 47-51). In this alternative, Vasalos et al. teaches that the metallic components can be introduced into the catalyst matrix during manufacture or impregnated onto the catalyst structure (column 14, lines 51-55). However, in either case, the Vasalos et al. reference states (column 14, lines 55-58) that care should be taken to provide a metallic promoter or metallic reactant on the molecular sieve in a manner which does not adversely affect the cracking activity and selectivity of the cracking catalyst.

According to Patent Law, a compound or composition of matter is anticipated if the disclosure in a single reference places that compound or composition in the possession of the public. In *re Brown*, 329 F.2d 1006, 1011, 141 USPQ 245, 249 (CCPA 1968). However, the reference must "clearly and unequivocally" disclose the claimed invention or direct those skilled in the art to the compound.... In *re Arkley*, 455 F.2d 586, 587; 172 USPQ 524, 526 (CCPA 1972). Further, one may use additional references to interpret a primary reference offered as an anticipation to show what the reference meant to those skilled in the art at the time of Applicants' invention. See *Studiegesell-Schaft Koble, m.b.H. v Dart Indus.*, 726 F.2d 724, 726; 220 USPQ 841, 842 (Fed. Cir. 1984).

Applicants' invention as now claimed requires the inclusion of vanadium metal as the first metal component on a molecular sieve component comprising the catalyst. However, it was well known in the catalysis art at the time of Applicants' invention that the presence of vanadium on a cracking catalyst resulted in a loss of both activity and selectivity. See "Vanadium Poisoning of Cracking Catalyst: Mechanism of Poisoning and Design of Vanadium Tolerant

Catalyst System" Journal of Catalyst, Vol. 100, pgs. 130-137 (1986); U.S. Patent 3,711,422, Johnson et al., issued January 16, 1973; U.S. 3,977,963, Readal et al., issued August 31, 1976; and "Metal Resistant Fluid Cracking Catalysts" ACS Symposium Series, Chapter 21, pg 343 (1990).

It is clear from the teaching of the enclosed references that one skilled in the art would have expected at the time of Applicants' invention that the inclusion of vanadium on the molecular sieve cracking catalyst would adversely affect the cracking performance of the cracking catalyst. Consequently, it is believed that Vasalos et al. reference teaches one skilled in the art that where the metallic promoter is vanadium, vanadium is not placed on the molecular sieve cracking component as claimed by applicant, but is rather placed on an alternative support such as an amorphous cracking catalyst or a solid which is substantially inert to the cracking reaction, to avoid loss of cracking activity and/or selectivity. The Examples of Vasalos et al. clearly support this teaching. Example 17 discloses the use of vanadium impregnated on alumina. There are no Examples that show that the vanadium was incorporated directly into or onto a molecular sieve component. Consequently, it is believed that when read in light of the general knowledge of one skilled in the art at the time of the invention described in the Vasalos et al. reference, Vasalos et al. fail to anticipate Applicants' invention by failing to "clearly and unequivocally" direct those skilled in the art to make the selection of putting vanadium, alone or in combination with a cerium-containing metal, on a molecular sieve cracking catalyst as claimed by Applicants. Withdrawal of the rejection is therefore respectfully requested.

35 USC 103

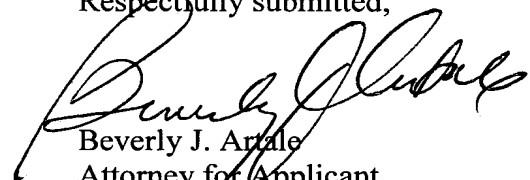
Claims 19-20 and 28-229 stand rejected under 35 USC 103(a) as being unpatentable over Vasalos et al. as applied to claims 17-18, 21-27 and 30 above, and further in view of Chu or Miller et al. This rejection is respectfully traversed.

The Vasalos et al. reference fails to anticipate or render obvious Applicants' for reasons as stated herein above. The Chu and Miller et al. references have been relied upon by the Examiner to show that conventional cracking catalyst include large pore zeolites such as zeolite Y in its ultrastable form and Y-type zeolite such as USY. Neither reference however teaches or in

any way suggests the inclusion of vanadium metal in the pores of a molecular sieve type cracking catalyst, whether a USY or a zeolitic cracking catalyst, to provide a composition suitable to reduce the sulfur content of cracked products produced during an FCC process. Consequently, this rejection is not proper and should now be withdrawn.

For reasons as stated herein above, Applicants' invention is patentable over the prior art of record. Allowance of claims 17-22 in the subject application is therefore respectfully requested.

Respectfully submitted,



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